CONCERNING THE SEX AND AGE OF AFRICANS SUFFERING FROM TRYPANOSOMIASIS

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An analysis (Table II) of the 79 cases of trypanosomiasis seen among 12,298 natives of the Gambia Protectorate[1] shows that 76% of those found to be infected are adults, 24% of them are children and none are aged; there are more boys (16·4%) than girls (7·6%) among the cases, but the proportion of men and women infected is approximately equal. It is probable that these figures approximate a usual incidence of the disease in the Gambia since all of the cases seen there in 1902 occurred in children and middle-aged adults.[2]

An analysis (Table I) of the results obtained in 1911 by the examination of 9,069 Gambian natives, whose posterior cervical triangles were palpated for enlarged glands, shows that a slight degree of glandular enlargement is common among children of both sexes, but especially in boys—probably because boys are less careful of their person than are girls. Much enlarged '+' glands occur most often in young adults—76% of the cases of trypanosomiasis seen in the Gambia in 1911 belong to this class—and trypanosomes were found in every person, with much enlarged glands, who was examined for them.

Kinghorn[4] noted that all of 89 cases of trypanosomiasis seen by him on the Gold Coast were under 42 years of age; most of them were young adults. He also reported[5] that glandular enlargement is much more common in males than in females, and in children than in adults.

In Nyasaland, Sanderson[6] reported that of 47 cases of trypanosomiasis 38·3% were women and 53·2% were men,

TABLE I.—The incidence of enlarged posterior cervical glands among 9,069 natives of the Gambia classified according to their sex and age, 1911.

	Sex	Male			Female		
	Age	0—13	14—44	45—	0—11	12—39	40—
Percentages showing the incidence of varying degrees of glandular enlargement among members of the classes indicated	'+'* or much enlarged glands	0·4%	5·9%	0·2%	0·2%	6·5%	0%
	'+-' or slightly enlarged glands	2·2%	1%	0%	1·7%	1%	0·3%
	'+--' or very slightly enlarged glands	42%	19·5%	11%	28%	13%	4%
	'-' or normal glands	55·4%	73·6%	88·8%	70·1%	79·5%	95·7%
	Totals ...	100%	100%	100%	100%	100%	100%
Number of individuals of each class examined	9,069	2,024	2,200	490	1,411	2,283	661
Percentage of total number of natives examined represented by each class	100%	22·3%	24·3%	5·4%	15·5%	25·2%	7·3%

* The precise degrees of enlargement signified by the terms '+,' '+-' and '+--' are described on page 11 of our Congo report.[3]

8·5% were boys, while no girls were infected. Hearsey[7] also points out that, in Nyasaland, two cases are found among men for every one seen in a woman.

The observations mentioned in these reports have much in common. They all record the occurrence of more cases of trypanosomiasis among adults than among natives of any other class. Unfortunately, the ages of the natives examined and the degree of their glandular enlargements are not all recorded in the same way, so that it is not possible to compare these observations exactly with those made in the Gambia. But, because there is a general similarity between all of these observations, it seemed advisable to examine the records of natives seen in the Congo in 1903,[3] in order to ascertain whether the same conditions had existed there.

Almost 90% of the total number of cases of trypanosomiasis seen in the Congo Free State were in young adults (Table II). It was thought that these figures might give a wrong idea of the relative incidence of the disease at different ages, because, for two reasons, most of the natives examined were young adults; first, because natives of the Congo were unaccustomed to Europeans, and the tendency was for women, children and the aged to hide from the members of the expedition; and, second, because, by the opening up of the country, large numbers of young men, sometimes with their women, were drawn to the European settlements to act as labourers and soldiers—such persons were easily examined, and the cases of trypanosomiasis seen in European posts came almost entirely from among them. Consequently, the cases of trypanosomiasis seen in the Congo are divided (Table II) into two groups according as they occur in populations subjected to these selective influences or not. The total number of cases dealt with is comparatively small, but it is interesting, nevertheless, that the total percentage of young adults infected is the same in each group. Since the selected population contains many more males than females, it is only natural that the percentage of infected males is greater among cases of trypanosomiasis coming from it than among those drawn from a population not subjected to selective influences.

With the exception that the percentage of young people among the cases is greater, the incidence of trypanosomiasis in the Gambia differs slightly from its incidence in the Congo. The difference can

TABLE II.—The percentages of cases of trypanosomiasis seen in the Congo and in the Gambia, belonging to groups limited by sex and age.

Sex	Male			Female			Totals	
Age	0—13	14—44	45—	0—11	12—39	40—	Percentages	Number of cases seen
Cases seen among selected populations in the Congo, 1903-05	6·7%	63·2%	0·7%	2·6%	26·8%	0%	100%	269
Cases seen among unselected populations in the Congo, 1903-05	6·1%	57·2%	2%	2%	32·7%	0%	100%	147
Cases seen in the Gambia, 1911	16·4%	39·3%	0%	7·6%	36·7%	0%	100%	79

be accounted for, in great part at least, by the much larger proportion of adolescents among the Gambian natives examined; compare the figures, in Tables I and III, stating the percentages of the total number of natives examined, represented in each locality, by children, adults and old persons. In the Gambia, where the natives are habituated to the presence of Europeans, the huts were entered and, often, every member of a village was examined; but, even there, it is probable that many timid girls were not seen, while the large percentage of boys recorded is the result of their willingness to be examined. In order that it may be possible to compare the observations made in the Congo with those made in the Gambia, the figures for the Congo given in Table III, as far as possible, record only examinations made in native villages where no evident avoidance of the members of the expedition was manifest, and where the nature of the population was uninfluenced by economic conditions.

The results obtained by gland palpation in the Congo (Table III) agree with those obtained in the Gambia (Table I) in the general absence of enlarged glands in old persons; they are dissimilar in the larger percentages of children and of adults with considerable degrees ('+' and '+ −') of glandular enlargement. There is certainly a close connection between these increased percentages of enlarged glands and the much more frequent occurrence of trypanosomiasis among natives of the Congo; it has already been made clear that, in the Congo[3] as well as in the Gambia,[1] enlarged cervical glands mean trypanosomiasis. In 1911, it was estimated that 0·8% of the native population in the Gambia had trypanosomiasis; there, cases only occur sporadically.[1] It is scarcely possible to estimate the probable percentage infected among the natives examined in the Congo in 1903-05, but it is certain that 30%, and often more, of the natives in many of the villages visited were infected[8]; nothing approaching such an epidemic exists in the Gambia.

The smallness of the numbers recorded for old persons in all of the tables is striking. The figures given for the Gambia (Table I) are probably not very incorrect; though they doubtless tend to err, in the same way as those given for the Congo (Table III) which, for reasons already given, are probably lower

TABLE III.—The incidence of enlarged cervical glands among 4,647 natives of the Congo classified according to their sex and age, 1903-05.

	Sex	Male			Female		
	Age	0—13	14—44	45—	0—11	12—39	40—
Percentages showing the incidence of varying degrees of glandular enlargement among members of the classes indicated	'+'* or much enlarged glands	8%	8·4%	0%	6·2%	6·3%	0%
	'+−' or slightly enlarged glands	26·8%	24·7%	6·5%	23·7%	18·3%	5·5%
	'+−−' or very slightly enlarged glands	22·9%	24·7%	6·5%	22·4%	22·2%	27·8%
	'−' or normal glands	42·3%	42·2%	87%	47·7%	53·2%	66·7%
	Totals ...	100%	100%	100%	100%	100%	100%
Number of individuals of each class examined	4,647	586	2,073	15	193	1,762	18
Percentage of total number of natives examined represented by each class	100%	12·6%	44·6%	0·3%	4·2%	37·9%	0·4%

* See (3) p. 11.

than they should be for children, especially girls, and for the aged. There is no means of determining whether the numbers of individuals of each class examined approximate those normally existing in an African population, because vital statistics have not been compiled for that continent. But, it seems probable, from an inspection of statistics for European races, that fewer old persons and more boys were seen than might have been expected. In 1900, males over 45 constituted 9·9% of the population of Massachusetts, and there were 11% of females over 45; a cursory inspection of the Scotch and Irish census returns for 1911 suggests that these figures are, if anything, rather below those normal for a European population. The proportion of children, especially boys, recorded for the Gambia (Table III) is considerably larger than that in Massachusetts, where about 11% of the population were boys under 13 and 10% were girls under 11 in 1900; although as large a percentage of girls are recorded by the census of 1900 in parts of Scotland as were seen in the Gambia the percentage of boys there was about four points less than it was in the Gambia.

Table IV has been drawn up in order to ascertain how the percentages of natives, belonging to groups limited by sex and age characters, would vary in natives of the Congo living in districts infected or uninfected by trypanosomiasis. The natives recorded in it are taken from those whose glands were palpated in populations unsubjected to the selective influences mentioned above (Table II). Old persons are again strikingly absent among natives from both infected and uninfected districts. As might be expected, the proportion of adults, especially of men, is much less among natives of infected districts. The death rate among them from trypanosomiasis is greatest, because they are most exposed to infection by their occupations.[1] It is well-known and many observers have reported that fishermen and riverine tribes are especially liable to be infected by trypanosomiasis.[8 p. 27]

In appraising the value of the figures stated in this paper, it is necessary to consider both the methods employed in collecting the data on which the figures are based and the form in which they are presented. All of the natives considered in Tables I and III were apparently healthy persons, and the clinically recognisable cases of sleeping sickness, seen among these populations, are not

TABLE IV.—The percentages of natives, examined in infected and uninfected districts in the Congo, 1903-05, belonging to various groups limited by sex and age.

Origin of natives	Sex	Male			Female			Totals
	Age	0—13	14—44	45—	0—11	12—39	40—	
Natives from infected districts	Percentage of total number of persons examined represented by each class	17%	38·3%	0·5%	6·5%	37·2%	0·5%	100%
	Number of persons examined in each class	230	518	7	87	503	8	1,353
Natives from uninfected districts	Percentage of total number of persons examined represented by each class	9·5%	47·9%	0·06%	4·04%	38·5%	0%	100%
	Number of persons examined in each class	135	686	1	58	552	0	1,432

included in these tables. The age of the natives examined was roughly estimated by their appearance, and the degree of their glandular enlargement was ascertained by a single, rapidly-made examination; it is obvious that slight errors might easily occur both in the estimate of age and the statement of the degree of glandular enlargement; as has been described already, a proportion of the population examined certainly escaped observation. The age periods used in classifying the natives contain an unequal number of years and the periods used for males and females are not the same; these unusual age limits were chosen because they represent,[1] approximately, the periods during which male and female natives follow the occupations of children, adults and elderly people. Therefore, in comparing the figures given in these tables, it must be remembered that errors in compilation have occurred and that the span of years, allotted by the classification employed, is for adults almost thrice that apportioned to children; consequently, a meaning can be attached only to very considerable and constant differences in the figures stated for each class. Finally, the total number of infected and uninfected natives observed is too small; but in spite of this, and although the methods employed are not sufficiently accurate to permit far-reaching conclusions, it does seem as though something may be learned from a cautious consideration of the figures given in the tables accompanying this paper. It is believed that a part of the large percentage of adults with enlarged glands and a part of the large percentage of adults among cases of trypanosomiasis may be due to the greater number of years apportioned to the adult class, but it is also believed that most of both percentages is due to an increased incidence of trypanosomiasis among adults. That adults should be most infected is reasonable since their occupations—washing, drawing water, fishing, farming and travelling—expose them most to infection.

Trypanosomiasis, more prevalent in the Congo than in the Gambia, is doubtless one of the reasons why the proportion of old people is less among natives of the Congo than among those of the Gambia, and much less among both populations than might be expected. Even although a large proportion of adults infected with trypanosomiasis and untreated die within three or four years[9] after contracting their infection, and although the aged are not

exposed to infection by their occupation, it is astonishing that the percentage of old persons among the cases of sleeping sickness and the percentage of old persons with much enlarged glands should be so small; it seems impossible that even so small a number of persons could live during their years among populations so much infected with trypanosomiasis without having been infected with the disease themselves. The only explanation which suggests itself is that some natives may be immune to trypanosomiasis.[1, 2, 5, 10] If an immunity does exist there are many reasons and analogies to indicate that it is not an absolute, 'sterilizing' immunity but a relative one in which the host is tolerant of the infecting parasite. It is very much hoped that the natives, found to be infected in the Gambia in 1911, will be kept track of, as can be done easily by the Commissioners of the districts in which they were seen; a record of the course of the disease in them would add considerably to our knowledge of the duration and outcome of infection by *Trypanosoma gambiense* in Africans.

The conclusions concerning the natives of the Congo and of the Gambia, which can be drawn from the facts presented and discussed in this paper, are stated in the following paragraphs.

1. The proportion of elderly individuals among them is lower than it is among Europeans (Tables I, III, and IV).

2. By far, the majority of cases of trypanosomiasis are persons of middle age; almost none of them are elderly persons (Table II).

3. The percentage of individuals with a considerable degree of glandular enlargement—which is coincident with trypanosomiasis—is very much greater in adults, and in children, than in elderly persons (Tables I and III).

4. It is possible that the low incidence of trypanosomiasis among elderly persons may be due, in part at least, to an immunity acquired by them.

REFERENCES

1. Todd, John L., and Wolbach, S. B. 'The Diagnosis and Distribution of Human Trypanosomiasis in the Colony and Protectorate of the Gambia.' Ann. Trop. Med. and Parasit., 1911, V, No. 2, p. 245. Reviewed, Sleeping Sickness Bulletin, 1911, III, No. 30, p. 336.

2. Dutton, J. Everett, and Todd, John L. 'First Report of the Trypanosomiasis Expedition to Senegambia (1902). Liverpool School of Tropical Medicine, Memoir XI, Liverpool, 1903.

3. Dutton, J. Everett, and Todd, John L. 'Gland Palpation in Human Trypanosomiasis.' Liverpool School of Tropical Medicine, Memoir XVIII, Liverpool, 1906.

4. Kinghorn, Allan. 'Age Incidence of Human Trypanosomiasis.' Sleeping Sickness Bulletin, 1912, IV, No. 40, p. 356.

5. Kinghorn, Allan. 'Report on Human Trypanosomiasis in the Western Province and in the Banda District of the Northern Province of Ashanti.' Sleeping Sickness Bulletin, 1911, III, No. 25, p, 138.

6. Sanderson, Meredith. 'The Human Trypanosomiasis of Nyasaland.' Trans. Soc. Trop. Med. and Hygiene, 1912, V, No. 8, p. 298.

7. Hearsey, H. Sleeping Sickness Bulletin, 1912, IV, No. 37, p. 195.

8. Dutton, J. Everett, and Todd, John L. 'The Distribution and Spread of Sleeping Sickness in the Congo Free State, with Suggestions on Prophylaxis.' Liverpool School of Tropical Medicine, Memoir XVIII, Liverpool, 1906, p. 25.

9. Todd, John L. 'Duration of Trypanosome Infection.' Arch. Intern. Med., 1911, April, VII, pp. 500-505; Sleeping Sickness Bulletin, 1911, No. 29, p. 274.

10. For other references see the indexes of the Sleeping Sickness Bulletins.